AFZC-ECM (1oo) 22 JAN 2007

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Disposal Guidelines for Flameless Ration Heaters (FRH)

1. Reference.

a. Food Service Flasher Message 01-10.

b. U. S. Environmental Protection Agency (EPA) letter, dated 29 Aug 2004.

c. U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) Fact Sheet, dated Mar 2005.

d. 40 CFR 261.4(b)(1).

2. PURPOSE. Flameless Ration Heaters (FRHs) can react violently if not handled properly and can cause serious human health and environmental consequences. This standing Operating Procedures (SOP) provides step-by-step guidance for the management and disposal of used and unused FRHs.

3. OBJECTIVE. To ensure proper management, handling, turn-in, and disposal of FRHs to protect human health and the environment.

4. APPLICABILITY. This SOP applies to all Fort Carson personnel who come across FRHs, including military, civilian, and contractors.

5. EFFECTIVE DATE. This SOP is effective upon signature and shall be reviewed and updated annually or as necessary.

6. RESPONSIBILITIES. All persons handling FRHs shall become familiar with this SOP upon assignment/attachment.

7. SAFETY/PROTECTION. All safety procedures will be followed when using FRHs. Do not re-use water that has been reacted with the FHR for consumption purposes.

8. TRAINING. All Soldiers shall be thoroughly familiar with this SOP.

9. OPERATION. The Department of the Army (DA) uses FRHs as a part of the Meal Ready to Eat (MRE) packages provided to Soldiers. The FRH heating pads (MRE heaters) contain magnesium. Magnesium reacts violently when exposed to water, forming a potentially explosive mixture (i.e. hydrogen gas). The improper use, handling, storage, or disposal of the heating pads could potentially produce an explosive atmosphere and endanger personnel and property.

a. FRHs Within Individual MREs – Unused or used FRHs disposed of by individual soldiers in the field may be discarded as general solid waste. This also applies to FRHs that are collected from a group of soldiers for disposal or reuse, as long as the FRHs were initially issued to a soldier for individual use.

b. Multiple Unused FRHs – Multiple unused FRHs not packaged with MREs and that have never been issued to a soldier must be managed as hazardous waste when disposed. Unused FRHs must be turned in to the Hazardous Waste Storage Facility (HWSF), Building 9246 for disposal as a D003 RCRA hazardous waste.

10. SOP PROPONENT. The proponent for this SOP is the HWSF Manager, 6-0980 or 6-8003.

Thomas L. Warren
Director, Environmental
Compliance and Management

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OCT 29 2004

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

Mr. Raymond J. Fatz
Deputy Assistant Secretary of the Army
(Environmental, Safety and Occupational Health)
Installations and Environment
110 Army Pentagon
Washington DC 20310-0110

Dear Mr. Fatz:

Thank you for your letter regarding proper management and disposal of waste unused flameless ration heaters (FRHs) at military installations. This letter responds to your request and to related correspondence from the Army on this topic.

The Army has requested EPA guidance regarding the appropriate waste classification and management under the Resource Conservation and Recovery Act (RCRA) for waste FRHs and the Meal, Ready-to-Eat (MRE), under several different situations. FRHs are packaged with MREs, and used to heat portions of the MRE. The attachment to this letter responds to each of the different situations for which the Army has requested clarification.

The EPA appreciates the Army's efforts to find an acceptable solution to the management of unused FRHs that is protective of the environment, and which also does not impede military operations or pose a safety concern to the soldier. Whenever possible, we encourage recycling of unused FRHs, either by returning them to the manufacturer or through consignment to surplus. When this is not possible, appropriate disposal, as described in the attachment, should be employed.

If you have any further questions regarding this matter, please feel free to contact me, or your staff may contact Gregory Helms at 703-308-8845, or helms.greg@epa.gov.

Sincerely,

Barry N. Breen
Principal Deputy Assistant Administrator

Attachments

Attachment
Classification and Disposal of Waste Flameless Ration Heaters[1]

The following discussion reflects EPA's assessment of flameless ration heaters (FRHs) in relation to federal waste regulations. In general, states are authorized by EPA to implement the RCRA hazardous waste program within the state. An authorized state's hazardous waste regulations are applicable within the state in lieu of the Federal regulations, and states' regulations may be more stringent than the federal regulations. Therefore, commanders of Army facilities should check with the appropriate state agency to confirm the requirements applicable to FRH management activities.

1. Disposal of a single, unused FRH.

The Army's letter of July 31, 2001, describes two common circumstances in which a soldier might dispose of a single FRH. The first case is disposal of the FRH as normal trash at a military installation. The second example is where soldiers are on training exercises in the field and must dispose of the FRH.

EPA believes that disposal of FRHs that are discarded by individual soldiers issued Meals, Ready-to-Eat (MREs) is excluded from RCRA Subtitle C regulation, under the household waste exclusion in 40 CFR 261.4(b)(1). Wastes generated by households were not intended by Congress to be regulated under RCRA as Subtitle C hazardous wastes, and EPA therefore has excluded hazardous wastes generated by households from RCRA Subtitle C regulation, allowing such materials to be disposed as ordinary solid wastes[2]. EPA believes that unused FRHs disposed of by individual soldiers in the field or at military installations are eligible for the household hazardous waste exclusion, under the circumstances outlined below.

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[1] EPA's discussion of MRE/FRH waste status provided here is based on data and a number of representations about FRHs provided in correspondence with the Army. Therefore, any opinion or conclusion presented here by the Agency is only as reliable as are the test data and other information submitted in accurately and fully describing the chemical and physical properties of MREs and FRHs that could become waste.

[2] See Senate Report No. 94-988, 94th Cong., 2d Sess., at 16 (1976). Under 40 CFR Part 261.4(b)(1), exempt household waste is defined as a waste that has been "derived from households (including single and multiple residences, hotels and motels, bunkhouses, ranger station, crew quarters, campgrounds, picnic grounds and day-use recreation areas)." In promulgating these rules, EPA explained that for a waste to be excluded from RCRA as a household waste it must meet two criteria: 1) the household waste must be generated by individuals on the premises of a household (temporary or permanent); and 2) the waste must be composed primarily of materials found in the wastes generated by consumers in their homes. See 45 FR 33120, May 19, 1980, and 49 FR 44978 November 13, 1984.

Even though the FRH is a technology used by the military in training and operations, and sometimes in situations unique to the military, the FRH has also become a commercial product easily obtainable by the general public for use in the household or for camping, hunting, hiking or in other similar situations. Therefore, the potential exists for civilian campers, hunters, or hikers to obtain FRHs and to use them or dispose of them without activation. Civilian disposal of the unused FRH in these circumstances would not constitute a violation of RCRA Subtitle C because of the household waste exclusion. The use and/or disposal of FRHs by individual soldiers, whether at their barracks, camps, or in the field, is not unlike the civilian use of FRHs, and would constitute generation of a household waste 'on the premises' of a temporary or permanent household. Therefore, we believe that a soldier who either disposes of an unused FRH, or activates an FRH before disposal, would not be subject to RCRA hazardous waste regulation because of the household waste exclusion. This exclusion would also apply where FRHs are collected from a group of soldiers for disposal or reuse, as long the FRHs were initially issued to the soldiers for individual use in a permanent or temporary residential setting.

2. Disposal of multiple, unused MREs (that contain FRHs).

The Agency believes that intact MREs, which include FRHs, are a different waste from FRHs alone, and so warrant a separate hazardous waste determination. This is because the Agency evaluates waste based on its composition "as generated."

Assembled MREs containing FRHs (MRE/FRHs) could potentially become waste at various points in their storage and distribution for use, including at Army bases of various sizes, during shipment, or at central warehouse facilities. However, stockpiled waste MRE/FRHs are not eligible for the household hazardous waste exclusion, because the waste MRE/FRHs are not generated by individuals on the premises of a temporary or permanent residence.

The most likely hazardous waste criterion that could be triggered by disposal of MRE/FRHs in a MSW landfill would be reactivity under 40 CFR 261.23(a)(2) or (3)[3]. In considering whether a waste, including waste MRE/FRHs, is reactive, the Agency tries to identify actual or plausible handling and disposal practices for the waste, and from these practices, identify which are most likely to pose a hazard. The potential hazards of a waste under plausible worst-case management are then compared with the regulatory criteria at 40 CFR 261, to determine whether they meet the criteria for a hazardous classification.

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[3] In promulgating the reactivity characteristic, the Agency cited the goal of the proposed rules: "This definition was intended to identify wastes which, because of their extreme instability and tendency to react violently or explode, pose a problem at all stages of the waste management process." And, in relying on the narrative reactivity definition rather than quantifiable tests, the Agency described factors to consider in applying the definition. including the fact that " because the reactivity of a waste sample is a function not just of its intensive properties such as density and composition, but also of its extensive properties, such as mass and surface area, the reactivity of the sample as measured by a test will not necessarily reflect the reactivity of the whole waste. (45 FR 33109-33110; May 19, 1980).

Presumably, the greatest hazard potential for MRE/FRHs would occur in the event that large numbers are disposed together, and this seems most likely to occur if a central warehouse is periodically disposing of large numbers of expired or damaged MRE/FRHs. In evaluating MRE/FRH waste in a landfill, we believe it is not necessarily reasonable to rely on the protectiveness of packaging materials. Instead, the Agency believes it is plausible to assume that MRE/FRH packaging would be ruptured at the time of disposal, and that the FRHs packaged with the MREs will react on contact with water from any source (liquids in the MRE, rainfall, or other water in the landfill).

Based on information provided by the Army in various correspondence, the Agency believes that waste MRE/FRHs are unlikely to meet the reactivity regulatory definition – even when disposed of in large numbers and assuming damaged packaging, as discussed below.

In developing the reactivity characteristic, the EPA was concerned about the potential for injury to persons (usually workers) and damage to property that could result from mismanagement of reactive wastes: "By definition, reactive wastes are those which are capable of violently generating heat and pressure, reacting vigorously with the air or water, reacting with water to generate toxic fumes, etc. (Reactivity Characteristic Background Document, 1980, p.4)

In applying 40 CFR 261.23(a)(2) to MRE/FRHs, the waste MRE/FRHs must react violently with water to fail this aspect of the reactivity characteristic. Responding to public comments on this part of the reactivity definition, the Agency described its intent that "The definition of reactivity refers to wastes which undergo violent change in an uncontrolled manner, either by themselves or when mixed with water." (Background Document, Characteristic of Reactivity, 1980, p. 23). According to materials provided by the Army, individual FRHs are designed to react with water in a controlled manner, and to release enough heat (187 BTU) to raise the temperature of the 8-ounce food entree by 100°F in 12 minutes. The final temperature of a heated entree would likely be 120°F-180°F (depending on initial temperature), and would be even lower if the whole MRE is being warmed (as in a landfill disposal situation). The temperature elevation that would be caused by MRE/FRHs reacting with water in a landfill is not great enough to cause a landfill fire or otherwise cause a significant hazard. We therefore believe the MRE is unlikely to fail the 40 CFR 261.23(a)(2) criteria.

Second, based on the results of Army tests of the hydrogen gas generated on reaction of the FRHs, we believe the rate of gas generation under plausible MRE/FRH waste management circumstances indicates that no potentially explosive mixtures would be generated (reactivity criteria at 40 CFR 261.23(a)(3)). Information submitted by the Army indicated that individual FRHs will generate H_2 at a rate of 1 liter/minute and generate a total of 8 liters of H_2. In the Army's laboratory tests of individual FRHs, the circumstances under which enough H_2 accumulated to sustain combustion were if the packet was re-sealed with tape after wetting, and the H_2 was then vented out a small hole in the packaging. In considering plausible management of the waste, if all packages were ruptured on disposal, and the MRE/FRHs activated, the H_2 generated would escape as it is generated through the same holes where water entered. Given the

dispersal of FRHs in MREs, and the rate of gas generation and dispersal of H_2 in the atmosphere or landfill, it seems unlikely that H_2 could accumulate in the landfill to the point of being an explosive mixture. We therefore believe it is unlikely that MRE/FRHs would be RCRA hazardous waste when disposed.

3. Disposal of multiple, unused FRHs

As stated in Mr. Robert Tonetti's letter of May 20, 1999 to Mr. Peter Levigne, Headquarters U.S. Army Soldier Systems Command, EPA generally considers multiple unused FRHs (not packaged with MREs) that are discarded to be a D003 reactive waste which, therefore, must be managed as a RCRA hazardous waste when disposed. (Copy enclosed.) The Agency's view was based on its concerns about potential FRH hazards, particularly if large numbers of waste FRHs were managed together (and without being packaged with MREs, which will disperse heat and H_2 gas that might be generated). The Army's letter asked if the protective FRH packaging material could be considered as limiting potential reactivity of the heater. As discussed above, we believe that it is plausible to assume that packaging material will be ruptured for most FRHs during the disposal process, so it is inappropriate to assign some protectiveness to them. Therefore, we arrive at the same conclusion as our 1999 analysis on this basis. Note that this analysis addresses situations that are distinct from the circumstance posed in the first question above where the MREs have been distributed to soldiers for use.

May 20, 1999

Mr. Peter Levigne
Headquarters, U.S. Army Soldier Systems Command
Natick, MA 01760-5018

Dear Mr. Levigne:

Thank you for your memorandum requesting that the Environmental Protection Agency (EPA) review data regarding the classification and disposal of unused Flameless Ration Heaters (FRH) for the Army's Meals Ready to Eat (MRE) in the context of the Resource Conservation and Recovery Act (RCRA).

My staff has reviewed the Material Safety Data Sheet (MSDS) prepared by the manufacturer of the FRH, ZestoTherm, Inc., and the June 15, 1998 report prepared by ZestoTherm and Environmental Quality Management. Based on this information and the enclosures in your letter, EPA disagrees with your conclusion that the unused FRH is not a hazardous waste when disposed. Our reasons for this disagreement are as follows:

1. This material reacts violently with water. Thus, the material is a D003 reactive waste. (See 40 CFR 261.23(a)(2).)

2. This material can form potentially explosive mixtures with water. By producing hydrogen gas, particularly where the gas could accumulate, the FRH could be a D003 reactive waste. (See 40 CFR 261.23(a)(3).)

We recognize that an accident involving a single FRH is unlikely. However, like other reactive wastes, an accident such as a violent physical reaction or a fire could result from a number of FRHs being mishandled simultaneously.

Various information that you provided helped us arrive at these conclusions. For example:

1. The warning label on the FRH itself states that "vapors released by the activated heater contain hydrogen, a flammable gas."

2. As stated in the report, the major component of the FRH, magnesium metal, is classified by the Department of Transportation (DOT) as a hazardous material due to its reactive nature with water. FRH skids in excess of 220 pounds are considered hazardous material and shipped accordingly.

3. The report's executive summary states that unused FRH skids should be pretreated prior to disposal to eliminate the need for transport as a hazardous material and use of a DOT-

licenced hauler.

4. Of the 13 treatment, storage and disposal facilities listed in Appendix D of the report, Robert Maxey of my staff spoke with six in detail about the waste. Three landfills stated outright that they would not accept this material as nonhazardous. Two incinerators indicated that the contact had been made on the basis that the waste was nonhazardous. Only one facility indicated that the waste was likely to be nonhazardous.

5. The Occupational Safety and Health Administration defines magnesium as reactive.

6. The MSDS states that the FRH is incompatible with acids, acid chlorides, strong oxidizing agents and that it reacts violently with halogens, chlorinated solvents, ammonium nitrate, carbonates, arsenic, cupric oxide, cupric sulfate, mercuric oxide and inorganic phosphates. While such contact in a properly managed landfill is unlikely, its consequence would be most serious.

The Department of the Army has several options, acceptable to the EPA, for management of unused FRHs:

1. The best option would be the reuse of these materials, since the Army would have a continuing need for them, unless the new FRH (based on phosphorous and calcium chemistry) is adopted. Note that products that have not been used, and which are to be used for their original purpose are generally not wastes under the RCRA hazardous waste regulations. Similarly, if these materials were to be reclaimed, they would likely not be regulated as wastes under RCRA. (See 40 CFR 261.2(c)(3) concerning unused commercial chemical products that are reclaimed.)

2. The FRHs could be incinerated as discussed in the June 15, 1998 report prepared for the Army. This would have to be performed at a hazardous waste incinerator.

3. The MSDS also recommends that the FRHs be reacted with water in accordance with the instructions and then disposed as ordinary waste. Such activities would have to be conducted following all applicable Federal and state regulatory requirements. Under the Federal regulations, depending on the specifics of the situation, the generator may be able to conduct such activities under the generator requirements of 40 CFR Part 262 (particularly 40 CFR 262.34). Alternatively, such activities could be conducted by a third party, following the applicable generator, transportation, and treatment, storage, and disposal facility requirements of 40 CFR Parts 262, 263 and 264/265. Note that in general, states are authorized by EPA to implement the RCRA hazardous waste program. An authorized state's hazardous waste regulations are applicable within the state in lieu of the federal regulations, and states' regulations may be more stringent than the federal regulations. Thus, you should check with the appropriate state agency, or if the state is not authorized, the EPA regional office, to confirm the requirements applicable to your FRH management

activities. Per 40 CFR 268.40, these materials would have to meet the "DEACT" standard and meet the 268.48 Universal Treatment Standards prior to any land disposal.

Note that in general, states are authorized by EPA to implement the RCRA hazardous waste program. An authorized state's hazardous waste regulations are applicable within the state in lieu of the Federal regulations, and states' regulations may be more stringent than the Federal regulations. Thus, you should check with the appropriate state agency, or if the state is not authorized, the EPA regional office, to confirm the requirements applicable to your FRH management activities.

The disposal of spent FRH materials, following normal use to heat a MRE, is not disposal of a hazardous waste. The FRH is an excellent means of providing hot meals to soldiers in the field and we are sympathetic to the waste disposal problem associated with unused FRHs. It is also important that these materials be disposed in an environmentally sound manner. Please contact my office or call Robert Maxey of my staff at 703-308-7273 if you have additional questions.

Sincerely,

Robert Tonetti, Chief
International and Special Projects Branch
Office of Solid Waste

cc: Ollie Fordham, EMRAD
Robert Maxey, HWID